affecting the substance of this nebula, the interval of three years since the first reliable records of its form and internal details were obtained is insufficient to enable me to say that any change has taken place in its structure; but this need cause no surprise, for I have compared a photograph of the great nebula in *Orion* which was taken in 1886 October with another taken in 1894 February, the interval between them being seven years and four months, and although that nebula appears also to be in a state of violent commotion, I have been unable to find that perceptible changes have taken place in the structure of the nebulosity.

Our work, therefore, is to make, preserve, and publish accurate records of the present state of these celestial bodies on a scale sufficiently large to show their structure, and trust that our successors of twenty or thirty years hence will by repetition of our processes obtain data for largely increasing astronomical knowledge.

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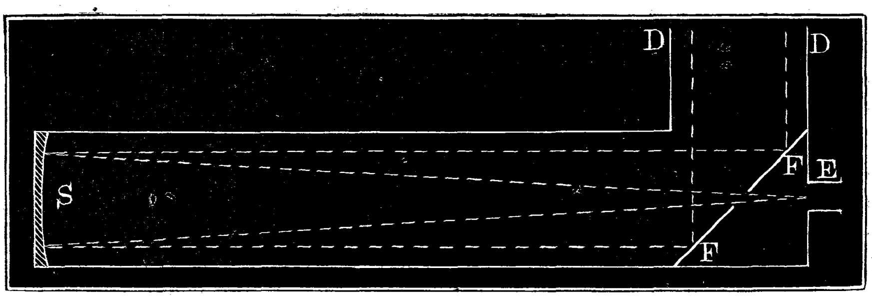
## *Note on a Suggested Form of Equatorial Mounting for a (modified) Newtonian Reflector.* By Rev. Charles D. P. Davies, M.A.

Attention having been drawn by Dr. Common at the meeting in January to a modified form of Cassegrain reflector, and the general subject of reflectors having been thus brought into prominence, I beg to submit the following ideas, which I have long had in mind, on a modified form of Newtonian equatorial.

First as regards the telescope; second as regards its mounting.

For the form of the telescope I claim no novelty, as I remember seeing it suggested some years ago—I think by Mr. Brashear. It is essentially a modification of the Newtonian. The speculum, both in itself and in its position, is entirely Newtonian. But at the upper end of the tube is an elliptical flat, set at an angle of 45°, having its minor axis equal to the diameter of the speculum; that is to say, it fills up the tube. This flat is the first glass to receive the rays of light, which are admitted by a suitable opening in the side of the tube. The rays reflected at a right angle pass, still parallel to each other, down to the speculum, whence they are returned to a hole in the centre of figure of the flat. Through this hole they pass to the eyepiece.




S speculum, F flat, E eyepiece.

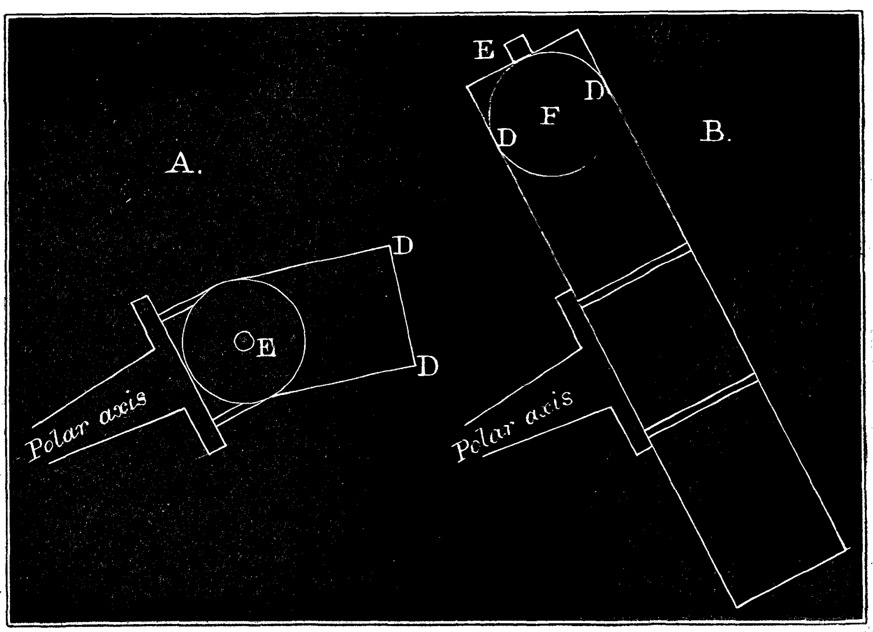
Fig. 1.

Optically the instrument is perfect—at least there is no distortion. There is only the usual number of two mirrors of the usual Newtonian figure.

The observer is well removed from the opening of the tube, so that the interference of heated air from his body is avoided—at least quite as much as it is in the ordinary Newtonian.

But compared with the latter this form has two very distinct advantages. First, there is a complete absence of the troublesome flare and "wings" produced by the steel strips generally employed for the suspension of the ordinary flat; and not only so, but there is also an absence of the defection of light caused by their intervention; and to both of these there is to be added the fact that the hole for the eyepiece, except in small telescopes, would probably not be nearly so large in diameter as the cell of the common flat. Secondly, the occurrence of tarnish. A spot of tarnish of given diameter (say $\frac{1}{2}$ inch) on an ordinary flat (say 2 or 3 inches minor axis) affects an immensely greater proportion of the total light than would be affected by a spot of the same diameter on the larger flat proposed.

I am far from wishing to be blind to any difficulty. The larger flat would of course be more expensive not only owing to its size, but by reason of the necessary drilling of the hole. (Possibly this might be avoided by their being cast ready of the required form.) But this drawback once fairly stated I must confess that at present I can see no other.




(A) In the meridian viewing a circumpolar star at its lower culmination.

(B) Six hours from meridian viewing the rising of an equinoctial star.

Both elevations from the East.

Fig. 2.

As regards fixing the flat much the same lines would naturally be adopted as those in general use for specula. The question of dew might easily be met by any desired prolongation of the circular opening D D made of almost any light material.

I come now to the second but chief point in the present paper. This is the question of the mounting. It appears to me that this form of telescope is eminently suitable for mounting as an equatorial. I would mount it as follows :—I would put the telescope itself in the position generally occupied by the declination axis. That is to say, I would put it across the centre of the upper end of the polar axis, with its axis of collimation at right angles to the polar axis, making it revolve for declination on its axis of collimation. That is to say, the line of collimation of the telescope will be the declination axis.

Among the advantages of this form of mounting it seems to me that we can reckon on the following :

(1) Absence of that most undesirable of all adjuncts, the counterpoise, that terrible mass that doubles the weight to be carried by the two axes, besides taking up much valuable space in the dome.

Appended to this consideration it may also be observed that there is an absence not only of the counterpoise, but of the declination axis itself with still further consequent lightening of the weight to be borne by the polar axis.

(2) Increase of stability of the instrument, inasmuch as not only is the telescope firmly held on either side of its centre of gravity by the brackets attached to the upper end of the polar axis ; but carried, as it is, immediately on that axis instead of being held out at arm's length from it, there must be far less liability to flexure, the great enemy of exactitude, and equally less liability to tremor.

(3) With this mounting the telescope is perpetually free for actuation by the clock. No position can be reached in which it must be reversed to the other side of the stand. The telescope may be directed to any star, the clock started, and left to do its work for twenty-four hours if necessary.

(4) Possibility of uniform height of the eyepiece above the observer's standing or sitting level in every position of the telescope. This I would secure by a circular platform or gangway of suitable diameter around the instrument in the plane of the equinoctial. With a little simple adaptation or variation this could be managed even in the proximity of the equator. In our own latitude the platform would consist of steps of moderate gradient, while in the high latitudes it would become little, if anything, more than a gentle slope. An observing chair could be made to suit the steps and gradient of the platform. No screwing up or

down ladders, no hydraulic or other lifting and depressing of floors.

(5) At all times and in all positions of even the largest telescope, every part of it along its whole length from speculum to eyepiece is within reach of the observer or his attendant, without climbing of any sort.

(5a) Attachment of handles for slow motion in R.A. and Dec. would be greatly simplified.

(6) As the rotation of the tube in its cradle would form the setting for declination, it is manifest that any necessity for that process during the progress of a lengthened observation would entirely vanish.

(7) Absolute freedom of view to any part of the celestial vault. The whole heavens would be open to the instrument without any need of reversal from E to W, or *vice versâ.* Here is an advantage over any other non-counterpoised form of mount that I know. Take for instance the "hay-fork" mount. Unless the prongs of the fork are too long for complete stability, there is a certain amount of restriction to the scope of the instrument. And having mentioned the "hay-fork" I may add that when its telescope is at any considerable distance from the meridian there must be a very unfair amount of weight and cross strain on the prong that for the time being is lowest.

(8) Last but not least, a saving in the size of the dome, and therefore in its weight, and in the size and expense of the whole observatory—a saving that might easily more than compensate for the form and larger size of the flat.

## *Observations of Minor Planets made with the 15-inch Equatorial of the National Mexican Observatory, Tacubaya.* By Felipe Valle.

(*Communicated by the Secretaries.*)

Long. W. $6^h\ 36^m\ 46^s.53$. Lat. N. 19° 24′ 17″.5.

| Date. | Mean Time. | Planet − ✱ Δα. | Δδ. | No. of Comps. | Planet App. R.A. | Log (ρ×Δ) of Parallactic Factor. | Planet App. Decl. | Log (ρ×Δ) of Parallactic Factor. | Red. to Day. | | No. of Comp. Star. |
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